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BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 6



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BIOCHEMISTRY

UDC 615.37.012.1

BASIC STATUS AND DEVELOPMENTAL PROSPECTS OF CHEMICAL VACCINES

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 5, 1980 pp 81-90
manuscript received 22 Mar 79

VOROB'YEV, A. A.

[Abstract] This survey of the state and prospects of chemical, or rather molecular, vaccines shows that, compared with live vaccines, chemical vaccines are less reactogenic, produce fewer complications, are more standard, and have a longer shelf life. Moreover, they can be used to develop multicomponent associated preparations against many infectious diseases. The development of molecular vaccines can be speeded up by focusing effort on the solution of such basic problems as: 1) in-depth research into the structures of the microbial cells responsible for the specificity of antigens; 2) decoding of the active centers of the specific antigens of microbial cells; 3) improvements in techniques of isolating and purifying molecular antigens from the microbial cell without disrupting their specificity; 4) refinement of the design principles of molecular vaccines; 5) development of a reliable and economical vaccine production technology; 6) in measure with the advances in the knowledge of natural antigens, chemical synthesis of specific and more immunogenic vaccines. The state of the art and developmental prospects in each of these fields are discussed. References 15: 13 Russian, 2 Western.

[409-1386]

UDC 615.324+615.322 (260)

PHYSIOLOGICALLY ACTIVE SUBSTANCES FROM MARINE ORGANISMS AND THEIR POSSIBLE MEDICAL APPLICATION (A REVIEW)

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 8, 1980 pp 25-32
manuscript received 7 Jun 79

KOROTAYEV, G. K., NOSKOV, V. A. and VOROPAYEV, V. M., All-Union Scientific Research Institute on the Technology of Blood Substitutes and Hormonal Preparations, Moscow

[Abstract] The therapeutic action of substances isolated from algae, sponges, coelenterates, mollusks, echinoderms and fish is reviewed. Algae have been the

source for polysaccharides with sulfa groups with antibiotic and antiviral activity; polysaccharides (carrageenan from red algae) effective in treating gastric and intestinal ulcers; some polysaccharides with anticoagulant properties; and some substances (kainic and domoic acids) that exhibit antihelminthic action. A substance from a blue-green alga suppresses lymphocytic leukemia in mice. The nucleosides, spongouridine and spongorthymidine, which are used in the synthesis of the antineoplastic agent, cytarabine CA, have been isolated from sponges; other sponge nucleosides (Ara-A) exhibit antiviral activity (herpes simplex, smallpox). Of over 1200 sponges studied, more than half contained substances with antimicrobial action. Substances with antimicrobial and antineoplastic activity have been isolated from coelenterates. Prostaglandins were found in soft corals. Substances with neurotropic and cardiotonic action and a vasodilating factor were also identified. Mollusks have been the source of substances with antimicrobial, antiviral (paolin) and antineoplastic action (mercenin). Other compounds from mollusks include tetratin with curare-like activity; anteramin with serotonin properties; murezine, an acetylcholine-like substance; and eledoisine, a decapeptide with hypothermic action. Triterpenoid and steroid glycosides with antineoplastic and antifungal activity (e.g., holothurins, holotoxin) were isolated from echinoderms. Holothurins and echinoderm saponins have been shown to block neuromuscular conductivity. Fish were the source of substances with clinical application: eptatretin, a peptide affecting myocardial activity; tetrodotoxin with neurotropic and cardiotonic action, which is being tested in Japan and the U.S.A. as an analgesic and tranquilizer. Calcitonin from salmon has been used to treat bone disease.

Table 1; references 89: 6 Russian; 83 Western.

[130-9307]

UDC: 615.281.8:547.592.1].012.1

SYNTHESIS AND ANTIVIRAL ACTIVITY OF ADAMANTYLPHENOL HALIDES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 14, No 2, Feb 80,
pp 54-57, manuscript received 17 May 79

SHVEDOV, V. I., SAFONOVA, O. A., KORSAKOVA, I. Ya., BOGDANOVA, N. S.,
NIKOLAYEVA, I. S., PETERS, V. V. and PERSHIN, G. N., All-Union Scientific
Research Institute for Chemistry and Pharmacy imeni S. Ordzhonikidze, Moscow

[Abstract] This article presents the synthesis and the study of the biological activity of the adamantyl analog of tebrophen in which one of the benzene rings is replaced by an adamantyl group, which has demonstrated antiviral activity in a number of other compounds. 4-(adamantyl-1)phenol and 4-(adamantyl-1)resorcinol were synthesized by boiling 1-bromoadamantane with phenol or resorcinol in benzene. Biological testing was also performed on 1, 3-bis-(3-iodo-4-oxyphenyl)-adamantane; 2, 6-dibromo-4-(adamantyl-1)resorcinol; 1-bromoadamantane; and 2, 4, 6-tribromoresorcinol. The halogen derivatives of adamantylphenol and adamantyl-resorcinol were tested against 2 viruses: A/PR/8/34 (HON 1) and A/Bethesda/63 (H2 N2). It was found that 2, 6-dibromo-4-(adamantyl-1)resorcinol, 2, 6-dibromo-4-(adamantyl-1)phenol and 2-iodo-4-(adamantyl-1)phenol had virucidal effects, the first of the three having the strongest effect. No virustatic effect was observed. References 8: 3 Russian, 5 Western.

[374-6508]

UDC 615.372:576.851.511/.015.46

OPSON ACTIVITY OF IMMUNOGLOBULINS DERIVED FROM ANTHRAX ANTISERA

Moscow LABORATORNOYE DELO in Russian No 5, 1980 pp 308-310

ASHMARIN, I. P., TARUMOV, V. S., POPOV, V. G., GORLANOV, A. A., STEPANOV, A. V., MARININ, L. I. and SHELUFKIN, A. I.

[Abstract] Studies were conducted with immune and nonimmune rabbit macrophages to assess opson activity of IgA, IgG, and IgM derived from anthrax rabbit antiserum with respect to vegetative *B. anthracis* cells and germinating spores. The results demonstrated that phagocytosis was enhanced only by IgM derived from the immune serum using germinating spores. None of the other combinations of macrophages and immunoglobulins yielded enhancement of phagocytosis with the spores or vegetative cells. The results were interpreted to indicate that the defensive mechanisms relying on phagocytosis are most effective in early stages of anthrax infection.

Tables 3; references 10: 3 Russian, 7 Western.

[342-12172]

UDC 576.858.21.095.6.083.35

REPRODUCTION OF FIXED RABIES VIRUS IN QUAIL FIBROBLAST CULTURE

Moscow VOPROSY VIRUSOLOGII in Russian No 4, 1980 submitted 23 Jan 80

NAGIYEVA, F. G., BEKTEMIROVA, M. S., MATEVOSYAN, K. Sh., BEKTEMIROV, T. A., PILLE, E. R., Moscow Scientific Research Institute of Virus Preparations, USSR Ministry of Public Health

[Abstract] A study of growing a culture variant of fixed rabies virus in Japanese quail fibroblasts involving a comparison of the use of roller-monolayer, roller suspension and monolayer cultures showed the roller monolayer cultures gave the highest virus yield. Titers of the virus in shaker cultures were 0.5 - 0.75 lg LD₅₀/ml lower than in roller monolayer cultures. Titers of the virus on the microcarrier (DEAE-Sephadex A-50) were the same as those in the monolayer roller culture. However, cultures on the microcarrier grown in suspension permit effective control of the conditions of growth and produce high density of the cell population. References: 7.

[116-2791]

ACCELERATED RADIOISOTOPIC METHOD TO ASSAY SENSITIVITY OF CHOLERA VIBRIOS TO ANTIBIOTICS

Moscow ANTIBIOTIKI in Russian Vol 25, No 5, May 80 pp 353-356 manuscript received 14 Nov 79

KOROL, V. V., PODOSINNIKOVA, L. S., GOLUBINSKIY, Ye. P. and RUBLEV, B. D., Rostov-on-Don Scientific Research Plague Control Institute; Scientific Research Plague Control Institute of Siberia and the Far East

[Abstract] In a search for a rapid method of determining sensitivity of cholera vibrios to tetracycline and levomycetin [chloramphenicol]—a method to be free of subjective evaluation and not cumbersome—use has been made of the inhibiting action of those antibiotics on protein biosynthesis in the bacterial cell. What is measured in the proposed method is the amount of ^{14}C amino acids (radioactive glycine, phenylalanine and lysine) incorporated into the vibrio cell protein. The procedure was tested on 39 antibiotic-sensitive and nonsensitive museum strains (including El tor). Uptake of amino acids by sensitive vibrios was inhibited, by a factor of at least 10, in the presence of the antibiotics; there was no essential difference in amino acid uptake in the nonsensitive vibrios (in the presence of the antibiotics). Results of assays of the sensitivity of the vibrios to tetracycline and levomycetin by the title, accelerated, method and the familiar, serial dilution procedure are tabulated. The title method is regarded as preferable (when labeled amino acids and radioactivity counters are available) because sensitivity data yielded by it are the same as by the familiar assay method and because it is simple to perform and is very rapid in execution (no more than 45 min). References 6: 4 Russian, 2 Western.

[401-8586]

CYTOCHROME P-450 INDUCTION AS ONE OF THE NEW PRINCIPLES IN THERAPY OF POISONING FROM ORGANOPHOSPHORUS INSECTICIDES

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 8, 1980 submitted 10 Oct 78 pp 55-57

KAGAN, Yu. S., KOKSHAREVA, N. V., OVSYANNIKOVA, L. M., and SAMUSENKO, I. I., Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics of the USSR Ministry of Health, Kiev

[Abstract] White mongrel male rats (160-200g) received phenobarbital per os in 70, 20, 5 and 1.5 mg/kg doses to determine phenobarbital's effect on activity of the paramagnetic form of cytochrome P-450 induced into rat liver as determined by the intensity of the electronparamagnetic resonance signal. Phenobarbital doses of 1.5, 20 and 70 mg/kg increased cytochrome P-450 induction and small doses (5 and 1.5 mg/kg) were effective without causing a soporific effect. The maximum induction occurred between 1st day and 3d day and persisted 4-5 days. The effect

was approximately the same after single and triple doses. All doses used reduced toxicity of all organophosphorus insecticides studied. References: 5; Figures: 3. [115-2791]

UDC 615.9.032.77

SOME ASPECTS OF KINETICS OF TOXIC CHEMICALS DURING ENTRY THROUGH SKIN

Moscow GIGIYENA TRUDA in Russian No 6, 1980 pp 42-44 manuscript received 22 Jan 80

GOSTINSKIY, V. D. and KRASNOPEVTSEVA, G. B., Regional Health Epidemiological Station, Novosibirsk

[Abstract] In vivo and in vitro tests on time-related absorption of a 45% lithium chloride solution and in vitro absorption of aniline were conducted for 4-hr on humans, rats and rabbits. Lithium penetration through skin decreased rapidly with exposure time and the time for the penetration of 50% of the lithium ions ($T_{1/2}$) was 55 min for rats and 37 min for humans. The rate of skin penetration by aniline increased with exposure time: $T_{1/2}$ was 159 min for rats and rabbits and 140 min for humans. The data for in vivo and in vitro penetration of lithium were similar and may be used for the determination of a safety factor during hygienic standardization. Mathematical analysis of the data on a logarithmic scale showed that it was possible to determine the in vitro permeability to lithium of the skin of test animals as a function of body weight for any exposure time. Permeability of skin from different body areas, when tested on cadavers, differed 1000-fold for lithium and 100-fold for aniline. Permeability of scrotal skin to lithium was 2706 times and for aniline 9% times higher than of skin on the soles. Figures 2; tables 2; references 6: 5 Russian, 1 Western.

[129-9307]

UDC 577.153.4:661.718.1:599:595.2

EFFECT OF ORGANOPHOSPHORUS INHIBITORS ON MAMMALIAN AND ARTHROPOD CHOLINESTERASES

Leningrad ZHURNAL EVOLYUTSIONNOY BIOKhimii I FIZIOLOGII in Russian No 3, 1980 submitted 5 Mar 79 pp 244-249

BALACHOVA, E. K., KUGUSHEVA, L. I., ROZENGART, V. I., SHERSTOBITOV, O. E., VASIL'YEVA, T. I., SAVCHENKO, K. N., ABDUVAKHOBOV, A. A. and DALIMOV, D. N., USSR Academy of Sciences Institute of Evolutionary Physiology and Biochemistry, All-Union Institute of Plant Protection, All-Union Academy of Agricultural Sciences, Leningrad, and Uzbek SSR Academy of Sciences Institute of Bioorganic Chemistry, Tashkent

[Abstract] A study of the effect on cholinesterases of different species of mammals (erythrocytes from man and rabbits, mouse brain) and arthropods (flies, spring grain aphid, rice weevil, spider tick) of dialkylthiophosphates contained in the split off part of the nature alkaloid molecule of lupinine from the *Anabasis aphylla* plant and its conformational isomer epilupinine results indicated

that an increase of the length of alkyl in lupinine derivatives increased their inhibitory capacity in respect to the mammals studied but reduced this capacity in respect to all arthropods studied. In respect to epilupinine derivatives, the same capacity remained for mammals but was absent for arthropod cholinesterase. These findings suggested significant differences in spatial structure of both esterase and anionic centers of the enzyme from mammals and arthropods. Cholinesterase from the mammals had less pronounced hydrophobic parts of the esterase center than that from arthropods. It was assumed that the difference between anionic and esterase centers of cholinesterase differs in enzymes from different species. References: 11.

[387-2791]

ANTIGENIC RECOMBINANTS OF HUMAN INFLUENZA VIRUSES WITH VIRUSES ISOLATED FROM WILD BIRDS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, 1980 submitted 13 Feb 80 pp 419-424

PODCHERNYAYEVA, R. Ya., BLINOVA, V. K., RONINA, M. V., SKLYANSKAYA, Ye. I., KAVERIN, N. V., and L'VOV, D. K., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] A study of some genetic signs (HA, I, ret, T_{56} and P_{min}) and virus-specific proteins in recombinants obtained involving *in vivo* and *in vitro* studies of antigenic recombinants obtained by crossing different human and animal influenza viruses, showed, in some cases the origin of inner virion proteins (NP and M) and nonstructural NS protein from one or another parent. The origin of gene HA from one or another parent, determined by gel-electrophoresis and antigenic analysis, coincided in all cases. References: 13; Figures 2.

[116-2791]

UDC 614.718-078

COMPARATIVE CHARACTERISTICS OF METHODS OF DETERMINATION OF BACTERIAL CONTAMINATION OF THE AIR

Moscow GIGIYENI I SANITARIYA in Russian No 4, 1980 submitted 13 Apr 79 pp 34-36

DROBENYA, V. V., Minsk Medical Institute

[Abstract] A comparative evaluation of the results of determining bacterial contamination of the air by the Krotov Apparatus and the experimental device PAB-1 (bacteriological aerosol sampler) based on the principle of electroprecipitation showed the new device to be more effective in trapping and measuring microorganisms in hospital air than the Krotov Apparatus. The new device, with some alterations, was recommended for use in videscala sanitary-microbiological studies.

References: 2.

[414-2791]

UDC 615.471:576.8(088.8)

DEVICE FOR PREPARING A STABLE POLYDISPERSED BACTERIAL AEROSOL

Minsk ZDRAVOKHIRANENIYE BELORUSSII in Russian No 7, 1980 pp 58-59 manuscript
received 23 Jan 80

DROBENYA, V. V., Minsk Medical Institute

[Abstract] Equipment consisting of an aerosol chamber, devices for preparation of a bacterial aerosol, passage through filter materials and subsequent disinfection was developed to investigate the effectiveness of trapping microorganisms with filter materials. Filter-purified air is passed through a flow meter by a compressor into an aerosol generator installed in a sealed aerosol chamber. The operating principle of the aerosol generator is that compressed air, emerging through a narrow annular slit formed between the liquid and air tubes, creates a vacuum in the zone of the liquid capillary. A bacterial suspension of the international reference strain of Staphylococcus aureus 209P was used to prepare the bacterial aerosol. Trapping effectiveness of microorganisms on the filters was evaluated by the difference in the number of growing colonies sown by the airborne aerosol before and after it passes through the filters. The air was then purified in filters and disinfected by ultraviolet light, which completely eliminated the possibility of microorganisms entering the environment.

[36A-6521]

UDC 615.371:576.858]:615.451.35].015.4:612.112.014.46:578.858.095.383

AN AEROSOL METHOD OF USING INTERFERON INDUCERS

Moscow VOPROSY VIRUSOLOGII in Russian No 4, 1980 submitted 11 Jan 80 pp 473-477

NOSIK, N. N., BALASHOV, V. I., BUKATA, L. A., POMINA, A. N., and YERSHOV, P. I.,
Institute of Virology D. I. Ivanovskiy, USSR Academy of Medical Sciences

[Abstract] A study of the aerosol dynamics of interferon accumulates in blood serum of mongrel white mice (10-12g) and green African guenons (2-3 kg) 1,2,3,4 and 5 hours (for mice) and 24, 48 and 72 hours (for monkeys) after administration of an interferon inducer (replicative from RNA of phage ϕ_2) by an ultrasonic aerosol generator showed this to be an effective method of treatment. The preparation prevented deaths in 75 percent of the mice after a dose of influenza virus of 10 LD₅₀ and in 65 percent of the animals after massive doses of the virus. Formulas and tables for calculating inhalation doses of the interferon inducer were presented and discussed. References: 9.
[116-2791]

UDC 613.632;615.285.7:633(213.5)

ASPECTS OF SAFETY IN THE USE OF NEW PESTICIDES IN HOT CLIMATIC CONDITIONS

Moscow GIGIYENA I SANITARIYA in Russian No 5, 1980 pp 10-11 manuscript received 21 Aug 1979

ATABAYEV, Sh.T., Uzbek Scientific Research Institute of Sanitation, Hygiene and Occupational Diseases, Tashkent.

[Abstract] Hygiene experts in Uzbekistan have conducted research on the use of pesticides in hot climates, in particular the problem of migration in soil, air and water. Organophosphorus pesticides persist for long periods despite the high temperatures and there is considerable seasonal variation in the pesticide content in the environment. Research conducted over many years has shown that organophosphorus residues persist 7 to 40 days in various media. Correct regulation of the periods in which pesticides are used can prevent environmental pollution; detailed figures were given for pesticide doses for various agricultural crops. R. U. Ubaydullayev has demonstrated a correlation between the content and concentration of pesticides as a function of air temperature, the distance away from the treated plot, and time elapsed since treatment. There is a need for hygiene standards to be established for pesticide use in Uzbekistan because of the special problems posed by the hot climate, which intensifies pesticide toxicity. Animal experiments are now underway to clarify hygiene problems associated with pesticides. The Uzbek Tashkent Scientific Research Institute of Sanitation, Hygiene and Occupational Diseases has worked out the maximum permissible concentration for more than 15 pesticides. The use of pesticides combined with large amounts of mineral fertilizers in the Central Asian republics stimulates pesticide absorption. Studies have been conducted on pesticide mixes used on vegetables and fruit, and it has been established that many factors are involved in changes in the biological value of the latter. On this basis, hygiene recommendations have been made. Research should be continued along the avenues discussed. References: 1 Russian. [402-9642]

UDC 615.285.7.099.015.4:[616.36+616.24]-008.9-092.18

BIOCHEMICAL AND MORPHOLOGICAL CHANGES IN WHITE RAT LUNG AND LIVER TISSUES DURING EXPERIMENTAL PARAQUAT POISONING

Moscow BYULLETTEN EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian No 8, 1980 submitted 17 Sep 79 pp 146-149

YAKUSHKO, V. Ye., RODIONOV, G. A., NAD'MAYMENI, L., and OVSYANNIKOVA, L. M., Laboratory of Biochemistry (head-Doctor of Medical Sciences U.A. Kuz'minskaya) of Pathomorphology and Histochemistry (head-Doctor of Medical Sciences G. A. Rodionov) and of General Toxicology (head-Professor Yu. S. Kagan) of the All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics of the USSR Ministry of Health, Kiev Presented by Academician USSR Academy of Medical Sciences L. I. Medved'

[Abstract] Male white rats (180-200g) were intoxicated by paraquat orally in triple doses of 25 mg/kg and in 12.7 and 6.35 mg/kg doses daily for 30 days (doses

correspond to 1/5, 1/10 and 1/20 of LD₅₀); they were beheaded on the 1st, 5th and 30th day and homogenates of lung and liver were studied spectrophotometrically and histomorphologically. Paraquat in these doses increased the free radicals level and reduced the superoxide dismutase activity in lung and liver tissue. Reduction of superoxide dismutase activity was increased by the repeated doses. A parallelism between biochemical and morphological changes in the lung and liver was observed. Reduction of superoxide dismutase and increase of concentration of free radicals was assumed to contribute to the proliferative processes causing pathological-morphological changes in the tissues studied. References: 13; Figures 3. [82-2791]

UDC: 615.9:612

PARAMETERS OF HEART ELECTRICAL ACTIVITY AS CRITERIA FOR DETERMINING THRESHOLD CONCENTRATIONS OF PESTICIDES

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR in Russian No 8, 1980 pp 74-78 manuscript received 29 Apr 80

LUKANEVA, A. M., and VOYTENKO, G. A., All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, USSR Ministry of Health, presented by Academician Yu. I. Kundiyev of the Ukrainian Academy of Sciences

[Abstract] A comparative study was made of the effects of different pesticides on bielectrical activity of the heart, when taken in via respiratory organs in hydroaerosol form, because of the importance of information about their effects and in order to properly develop means of preventing deleterious consequences. Experiments were conducted on male albino rats, and their electrocardiograms were compared to those of control animals. The tested pesticides were anilate (mono-ethanolamine salt of sulfonylic acid), maloran (N-(4-bromo-3-chlorophenyl)-N-methoxy-N-methylurea), afugan (2-(0,0-diethyltionophosphoryl)-5-methyl-6-carboethoxy-pyrazole-(1,5 a)-pyrimidine). The EKG changes conformed with changes in cholinesterase activity, peripheral blood findings with the use of afugan and anilate, respectively, but not when maloran was used, in which case EKG changes were a more sensitive indicator of toxicity. Chronic effects are compared to acute ones. Persistent electrical alternation combined with changes in other EKG parameters, such as conduction, can be qualified as a criterion of a threshold effect of the pesticides, more marked changes are indicative of a toxic process, while a subliminal effect is characterized by transient electrical alternation indicative of adaptive processes. Figures 1. References: 5 Russian. [84-10,657]

BIOTECHNOLOGY

UDC 575.114.4

EXPERIMENTS ON GENETIC ENGINEERING OF BACILLI

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 254, No 2, 1980 pp 493-495
manuscript received 3 Jun 80

YOMANTAS, Yu. V., RABINOVICH, P. M., REBENTISH, B. A. and STEPANOV, A. I.,
All-Union Scientific-Research Institute of Genetics and Selection of Industrial
Microorganisms, Moscow

[Abstract] There are at least two approaches which can be used to clone genetic material of bacilli: multiplication of DNA fragments in *E. coli* cells using specific vector molecules; and multiplication of genetic material of bacilli in *Bacillus* cells, using staphylococcal plasmids as the vector molecule. The multiplication of genes of the riboflavin operon of *Bac. subtilis* in cells of *Bac. subtilis* using the bireplicon plasmid pJJ10 (pBR322-pUB110) is discussed. The effect of the restriction system of *Bac. subtilis* on the efficiency of DNA cloning is shown. A method is developed for cloning DNA of *Bac. subtilis* in cells of *Bac. subtilis* ribD10^k recE^k. The DNA of plasmids isolated from *Bac. subtilis* can transform *Bac. subtilis* ribD10^k recE^k more efficiently than can the plasmid DNA obtained from *E. coli*. It is also possible that the increased molecular weight of plasmid pJJ101 as compared to the vector pJJ10 makes its DNA sensitivity to the restriction system of *Bac. subtilis*. Figures 2; references 8: 2 Russian, 6 Western.
[27-8617]

UDC 575.1

TRANSFORMATION OF BACILLUS SUBTILIS BY STREPTOCOCCAL PLASMIDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 254, No 2, 1980 pp 490-492
manuscript received 16 May 80

BOYTSOV, A. S. and GOLUBKOV, V. I., Leningrad Politechnical Institute imeni
M. I. Kalinin

[Abstract] *B. subtilis* is an excellent host cell for the study of possible heterologous expression of genes since it has been thoroughly studied and is used in the microbiological industry, but it has no intrinsic vector replicons. Several plasmids of *S. aureus* have antibiotic resistance genes and can stably replicate in *B. subtilis* cells. The transformation of *B. subtilis* by several native plasmids

isolated from *S. pyogenes* and *S. sanguis* is described. The Challis strain (*S. sanguis*, group II) was used in these studies. The results of homoduplex analysis suggest that inverted duplication of some genetic material promotes stable replication of streptococcal plasmids: inverted repetitions of various length were found in plasmids pV1203 and pV1204, but were absent from unstable plasmids pV1101 and pV1201. Streptococcal plasmids readily adapt to the new cytoplasmic environment of *B. subtilis* and are promising for creating vectors of the streptococcal-bacillic system. Tables 2; references: 12 Western.
[27-8617]

UDC 575.1:579.254.26

THE TRANSFORMATION OF PROTOPLASTS OF *BACILLUS THURINGIENSIS* VAR *GALLERIS* 69-6
BY PLASMID pBC16

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 253, No 3, 1980 pp 729-732
manuscript received 8 Apr 80

RYABCHENKO, N. F., BUKANOV, N. O., SAKANYAN, V. A. and ALIKHANYAN, S. I., The All-Union Scientific Research Institute for Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] Data showing the resistance of pBC16 to tetracycline and the plasmid's use in transforming *B. thuringiensis* and as a vector in genetic engineering are presented. Virulence to *Galleria mellonella* larvae sensitivity to the g3 parasite for the serotype, and the presence of the crystal in sporulating cells were observed. Plasmid DNA was obtained by processing with a 15 mg/ml lysozyme solution in a 25% sucrose base for 30 minutes at 37° C, followed by ultracentrifuging in a CsCl gradient. After complete protoplasts were obtained, they were treated with PBG. As plasmid DNA was separated from transformant clones of *B. thuringiensis*, it was noted that the DNA became more sensitive to lysozyme, which permitted using a 3-times weaker mixture of lysozyme. The increased sensitivity to lysozyme in all the transformant clones of *B. thuringiensis* was related to selective factors on the transformation process, rather than to the presence of plasmid in cells.
Table 1, references 10: 3 Russian, 7 Western.
[21-12131]

UDC: 547.963.3

CLONING OF A DNA FRAGMENT OF PHAGE λ CONTAINING THE GENES red AND gam

Moscow MOLEKULARNAYA BIOLOGIA in Russian Vol 14, No 3, May-Jun 80 pp 615-622
manuscript received 15 Jun 79

KHODKOVA, Ye. M. and ZAVIL'GEL'SKIY, G. B.

[Abstract] The capabilities of the phage λ red system in relationship to bacterial DNA are estimated. The techniques of genetic engineering allow the production and cloning of plasmids containing the genes of the repair and recombination system. The introduction of recombinant plasmids to various mutant strains allows analysis of the interaction of enzymes, their interchangeability, an increase in the content of the necessary enzyme in the cell; the purpose of the present work is to produce the recombinant plasmid containing genes responsible for recombination of phage λ and to describe this plasmid. Production of phage proteins N and Kil, lethal for bacteria by the use of the restrictase BamHI was attempted. However, the structure of the recombinant plasmid was unexpectedly complex and included an additional fragment consisting of two terminal DNA fragments which were cross linked. No clones were produced carrying the plasmid red⁺ gam⁺. The mechanism of transcription of genes from the promotor P_R in the recombinant plasmid remains unclear. Apparently either weak transcription occurs without activation of the product of gene Q or the plasmid pEH60 supports some synthesis of the product of gene Q. Apparently the C+E fragment consisting of the two terminal fragments of DNA of phage λ , cross linked through the ends m and m' has a stable transcription system, since a similar fragment was discovered earlier in the composition of a recombinant plasmid containing the active genes deo-operon and E. coli. Figures 5, references 27: 3 Russian, 24 Western.

[375-6508]

UDC: 547.962.32.07+577.155.2

SYNTHETIC OLIGODEOXYNUCLEOTIDES CONTAINING EcoRI AND HindIII RESTRICTION ENDONUCLEASE RECOGNITION SECTIONS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian No 1, 1980 pp 141-143 manuscript received 1 Nov 79

BERLIN, Yu. A. and ZVONOK, N. M., Institute of Bioorganic Chemistry imeni M. K. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] A number of oligodeoxynucleotides containing EcoRI and HindIII restriction recognition sections were synthesized by the phosphotriester method based on N-substituted nucleosides and studied. It was found that when EcoRI restrictase acts on the duplex (3²pI)·(3²pII), it splits at the expected places to form the mononucleotide 3²pG and the heptanucleotide 3²pAAGCTTG (3²pVI). The duplex (I)·(3²pII) in which the 5'-hydroxyl EcoRI is not phosphorylated is also split by EcoRI restrictase. The data indicate that the incapability of EcoRI restrictase to split an isolated site (VII)·(VII) results from peculiarities of the mechanism of action of this enzyme, that functioning requires minimal flanking of the

recognition sector. The results with HindIII restrictionase were quite different. The minimum dimensions of a duplex necessary for functioning of HindIII nuclease were found to be significantly greater than for EcoRI, at least 2 turns of the DNA double helix. References: 7 Western.
[383-6508]

UDC 575.1:576.8:631.461.5

POSSIBILITY FOR USING PLASMIDS TO INTENSIFY THE NITROGEN FIXATION PROCESS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 7, 1980 pp 5-20 manuscript received 15 Jan 80

KAMENEVA, S. V., Chair of Genetics, Moscow State University imeni Lomonosov

[Abstract] This is a review of non-Soviet work. Note is taken of today's increased demand for nitrogen fertilizers, a need which has risen with the requirements for more food to support increasing numbers of people. Energy is being expended to produce these fertilizers; expenses for processing and transportation of the fertilizers continue to mount. Biological fixation of nitrogen for plants appears to be the most effective way to nourish essential food producing plants. The biochemistry and genetics of nitrogen fixation are initially reviewed in this article to introduce the concept indicated in the article's title. Reviewed are literature contributions on transfer of genetic material and on study of the genetics of nitrogen fixation, *in vivo*, in bacteria which fix nitrogen--e.g., research on *Klebsiella pneumoniae* and localization, on the chromosome, of nitrogen-fixation genes; use of plasmids of *E. coli* and hybrid plasmids for genetic analysis; transfer of plasmids into *Rhodopseudomonas sphaeroides*; demonstration of capacity to transfer--to soil enterobacteria--genetic information of *Klebsiella* which can fix nitrogen. Also reviewed is the literature studies on transfer, *in vitro*, of nitrogen fixation information--e.g., introduction of nitrogen-fixing genes of *K. pneumoniae* into PMB9 plasmid; cloning of nitrogen fixing areas of various bacteria to accumulate such genes and their products. New species of nitrogen fixing bacteria can be produced. Problems of cost in creating desirable forms for use on an industrial scale still exist. No Soviet research contributions appear in this article. Figures 3; references: 45 Western.
[455-8586]

ENVIRONMENTAL PHYSIOLOGY AND THE CONQUEST OF SPACE

Moscow GIGIYENA VCHERA, SEGODNYA, ZAVTRA in Russian 1978 pp 86-91

LORANSKIY, D. N., Department of Health, People's University

[Abstract] A brief review is given of the history of development of life support systems for use in outer space. An examination is made of the problem of creating a small ecosystem with recycling of vital materials for extended space flights in the future. The optimum solution in the opinion of many specialists is the use of hydroponic techniques for growing plants that consume carbon dioxide and release oxygen, using only solar energy. An analysis is made of the special hygienic conditions that would arise in such an isolated biocenosis. It is mentioned that Soviet researchers about ten years ago spent an entire year in a sealed chamber simulating a spacecraft to study problems related to this area. One of the principal results of this study was a demonstration that green plants could supplement the diet of spacefaring crews while providing oxygen and absorbing carbon dioxide. Still unsolved are questions of the possible effect of products released by the plants on the human organism, and also the influence of microorganisms that are inevitably present in a closed space. One of the major problems to be solved by space hygiene is purification of recycled waste water. Another problem of independent interest is the part to be played by space hygiene in colonization of the moon and the terrestrial planets.

[9644/0139-6610]

UDC 613.693+612.014.14

THE PART PLAYED BY LOWER ORGANISMS IN THE MATERIAL CYCLE OF CLOSED ECOLOGICAL SYSTEMS. MATERIALS OF THE TENTH ALL-UNION CONFERENCE, KANEV, 1979

Kiev ROL' NIZSHIKH ORGANIZMOV V KRUGOVOROTE VESHCHESTV V ZAMKNUTYKH EKOLOGICHESKIH SISTEMAH. MATERIALY DESYATOGO VSESOYUZNOGO SOVESHCHANIYA, KANEV 1979 in Russian 1979 (signed to press 1 Jun 79) Izdatel'stvo "Naukova dumka", 1000 copies, 336 pages

KORDYUM, V. A. (editor)

[Abstract] A collection of papers dealing with development of life support systems based on organizing certain ecological processes in engineering equipment. Questions of mathematical modeling of such processes are considered as well as the development of specific components and specific processes. Particular attention is given to lower phototrophic organisms, which are a major component in all biological life support systems. Papers are also included that give results of research done on artificial satellites and space vehicles. The papers are grouped in six sections: 1. flight experiments; 2. systems, modules and components of the closed ecosystem and methods of analysis; 3. biology of phototrophic organisms; 4. biology of heterotrophs; 5. cenoses of closed ecological systems; 6. mechanisms of regulation and controlled biosynthesis.

[9644/0147-6610]

A CLOSED ECOSYSTEM INCLUDING MAN AND HIGHER PLANTS

Novosibirsk ZAMKNUTAYA SISTEMA: CHELOVEK-VYSSHIYE RASTENIYA (CHETYREKHMESYACHNYY EKSPERIMENT) in Russian 1979 signed to press 31 May 79, Izdatel'stvo "Nauka" 1100 copies, 160 pages

LISOVSKIY, Genrikh Mikhaylovich, doctor of biological sciences, professor (editor)

[Abstract] The book gives a description and analysis of a four-month experiment done in 1977 in an artificially created closed ecological system based on photosynthetic regeneration of water, air and plant food. The experimental technique and design of the system are presented, and data are given from phytophysiological, medical-biological, biochemical and microbiological studies of the system as well as its external and internal mass exchange. Chapter 1 "Ways to construct modern human life-support systems, and present problems of studying them" by I.A. Terakov and I. I. Gitel'zon; Chapter 2 "The Bios-3 experimental complex" by B.G. Kovrov, F. Ya. Sid'ko, G. V. Denisov, G. S. Petrov and V. I. Bezrukikh; Chapter 3 "The Program for conducting the experiment, and initial characteristics of the human element" by I. I. Gitel'zon and Yu. N. Okladnikov; Chapter 4 "Choosing the structure and conditions for functioning of the higher plant element" by G. M. Lisovskiy and M. P. Shilenko; Chapter 5 "The higher plant element in the experiment" by G. M. Lisovskiy and M. P. Shilenko; Chapter 6 "Biochemical and mineral composition of the plants grown in the human life support system and their capacity to provide the nutritional needs of the crew" by I. N. Trubachev, I. V. Gribovskaya, V. A. Barashkov and G. S. Kalacheva; Chapter 7 "The human element in the experiment (medical-physiological and hygienic research)" by Yu. N. Okladnikov, N.V. Vlasova, G. Ye. Kasayeva and V. N. Radionov; Chapter 8 "Microflora of the system and its dynamics in the experiment" by I. M. Pan'kova, L. S. Tirranen, L. A. Somova, N. S. Manukovskiy and M. N. Posadskaya; Chapter 9 "External and internal mass exchange of the system" by I. N. Trubachev, Yu. N. Okladnikov, I. V. Gribovskaya and G. V. Denisov; Chapter 10 "Summary and outlook for developing biological human life support systems" by I. I. Gitel'zon. Figures 40, tables 43, references 99.

[9644/0144-6610]

UDC 634.0.863

THE ACID HYDROLYSIS OF THE INEDIBLE BIOMASS OF CULTURED PLANTS GROWN IN AN EXPERIMENTAL BIOLOGICAL-TECHNICAL HUMAN LIFE-SUPPORT SYSTEM. I. THE CHEMICAL COMPOSITION OF POLYSACCHARIDES FROM THE INEDIBLE BIOMASS OF WHEAT AND CHUPA

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 80 pp 37-41 manuscript received 13 Jun 79

SAVEL'YEVA, T. G., ROLLE, A. Yu., VEDERNIKOV, N. A., SADOVSKAYA, G. M., NOVOSELOVA, O. I. and LISOVSKIY, G. M., Institute of Wood Chemistry, Latvian SSR Academy of Sciences, and Institute of Physics, Siberian Department, USSR Academy of Sciences

[Abstract] With the goal of including inedible biomass in the cycle of a closed human life-support system, quantitative acid hydrolysis was conducted using the straw, chaff and roots of sort 232 wheat from a four-month human-higher plant closed system experiment. The hydrolysate was analyzed by paper chromatography. It was found that the chaff contained the highest polysaccharide content (about 70%), that the straw had a lower polysaccharide level (53-58%) than Mironovskiy sort wheat from the 1976 harvest, used as a control, and that the roots had the lowest polysaccharide levels (up to 46%). Insoluble residue and lignin varied from 14 to 18% and was lower than the control, while mineral levels were higher. The easily-hydrolyzed polysaccharide contained 57% xylose, 15% arabinose, 10% glucose, 6% galactose and 1% uronic acids. The difficult to hydrolyze fraction was 90% glucose and 10% xylose, which indicates that it is more suitable for human food. The easily-hydrolyzed fraction can be used for microorganism cultures. Chufa (*Cyperus esculentus*) was found to have monosaccharide contents in its inedible biomass similar to wheat. The ash residue, which affects hydrolysis, was somewhat different for experimental wheat and the control. The data indicate the usefulness of including the inedible biomass in the material cycle of an ecological system. References: 15 Russian.

[232-12126]

UDC: 612.823.3.08

USE OF MICROCIRCUIT EQUIPMENT

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 9, 1980 pp 1421-1423
manuscript received 21 Feb 80

LOTAREV, A. N., and PATRIN, I. A., Chair of Medical Physics (headed by V. O. Samoylov), Military Medical Academy imeni S. M. Kirov, and Chair of Physiology (headed by A. S. Mozzukhin), State Institute of Physical Culture imeni P. F. Lesgaft, Leningrad

[Abstract] Voltage repeaters based on microcircuitry were developed and tested on the basis of previous reports on the possible use of microcircuitry. They were used to examine biopotentials (with the microelectrode method) of the frog's sartorius muscle fibers. An amplitude discriminator with microcircuitry

was also proposed for recording action current frequency, in conjunction with a cathode follower or voltage repeater, on an ink-printer. These instruments can be used for intracellular and extracellular derivation of biopotentials. The circuitry of both is illustrated. Figures 3. References: 2 Russian.
[85-10,657]

MEDICAL TECHNOLOGY

UDC 616-073.65:621.398

INFRARED SCANNING IN MEDICINE

Moscow MED. TSINSKAYA TEKHNIKA in Russian No 4, 1980 pp 13-19 manuscript received 11 Apr 80

MIROSHNIKOV, M. M., State Optical Institute imeni S. I. Vavilov

[Abstract] The principal characteristics of the "thermovisors" or medical infrared scanners produced in the USSR and abroad are compared. The design of the principal Soviet infrared scanner, the Rubin, is described. It is currently used as the basis for developing a computerized IR scanning system. In addition, the USSR has developed high-speed IR scanners of the Yantar' and TV-03 and other types for mass diagnoses as well as preliminary observations in special cases (admission rooms in surgical clinics, children's diseases, myocardial infarction, etc.). New trends in the development of IR scanning abroad include the use of liquid-crystal image converters, pyroelectric vidicons, and mosaic-type radiation sensors. IR scanning is a new harmless and effective diagnostic technique which can detect temperature differences of as little as fractions of 1°C on the surface of the human skin, which are associated with pathological processes occurring in the organism.

Figures 3.

[446-1386]

UDC 616-073.65:621.398

ANALYSIS OF THERMOGRAMS

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 4, 1980 pp 29-32 manuscript received 8 Apr 80

KURTEV, N. D. and ANTSYFEROV, S. S., Moscow Institute of Radio Engineering, Electronics and Automation

[Abstract] The techniques of analyzing IR scanning thermograms for the purpose of medical diagnostics are examined. While the problem of pattern classification is fundamentally solvable on the basis of statistical theories, the problem of the selection of pattern attributes is much more difficult. In this connection the development of a computerized interactive-type thermographic diagnosis system based on the use of comparatively simple processing algorithms is considered. The structure of the algorithms is based on the intended isolation of diagnostic features

from IR scanning patterns and their quantitative assessment. Attention is drawn to the expediency of utilizing statistical estimates of certain pattern features. This approach can assure the automatic processing and analysis of thermal patterns and find application in large scale preventive examinations of the population. Figure 1, references 13: all Russian.

[446-1386]

UDC 615.471:616-073.65:621.398

DESIGN FEATURES OF IR SCANNERS WITH ELECTROCHEMICAL RECORDING

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 4, 1980 pp 36-39 manuscript received 11 Mar 80

PADAIKO, G. A. and REZNIK, V. B.

[Abstract] The recording of thermal patterns on electrochemical paper is a major factor in reducing the cost of IR scanning. In Rubin-1, Rubin-2, and Rubin-3 IR scanners the EkhV-4 electrochemical paper used produces thermograms with a resolution of fewer than 10 gradations of optical density and costing 0.4-0.6 kopeck each. In the Rubin-3 scanner, in particular, scanning is performed in two directions (sine-wave), so that the electrochemical stylus also records the pattern in two directions on the drum. Further improvements in IR scanners with electrochemical recording, and in particular, the incorporation of a digital memory unit, should make possible the simultaneous use of electrochemical recording, visual observations of the CRT display, color coding, and data input into a computer. Figure 1, references 9: all Russian.

[446-1386]

UDC 616-073.65:621.398

INFRARED SCANNING--POSSIBILITIES AND PROSPECTS

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 4, 1980 pp 10-13 manuscript received 11 Mar 80

DEVYATKOV, N. D., Central Scientific Research Institute "Elektronika", Moscow

[Abstract] The optical characteristics of the human epidermis in the IR region of the spectrum are close to those of a black body. This fact as well as medical experience show that there exists a direct relationship between off-normal temperatures of discrete parts of the human body and pathological processes occurring in the organism. Thus, IR scanning or "thermovision" is a promising technique for the diagnostics of various kinds of diseases. In this connection, the design of a basic Soviet-built "thermovision set," the TV-03, is described. It consists chiefly of an infrared sensing chamber and a videocontrol unit: the image is observed on a CRT display and the thermal fields are measured with the aid of isothermal levels. The

accessories include a Zenit camera. Recommendations for developing special modifications of this basic unit for use in ophthalmology, otolaryngology, stomatology, and neurosurgery are given. It is expected that combining the IR optics technique with the radiometric technique of radiophysics should provide information not only about the temperature of the focus of interest to the physician but also about the depth and extent of its occurrence. It is also necessary to develop biomedical research into the mechanism of heat transfer and the correlation of the observed thermal fields with heat sources present inside the human body. Figure 1.
[446-1386]

UDC 615.471:616.12-073.96-71

MAGNETOCARDIOGRAPHY

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 2, 1980 pp 37-40

VASIL'YEV, B. V. and KOLYCHEVA, Ye. V., Joint Institute of Nuclear Research, Dubna

[Abstract] A method is described for securing magnetocardiograms (MCG) in an unshielded room, using a superconducting quantum interference device (SQUID). The gradiometer type SQUID magnetometer, immersed in a helium filled cryostat to maintain superconductance, was positioned vertically with the sensing coils in the horizontal plane. A typical MCG (the average of 16 recordings) is presented. Figures 2; references 9: 1 Russian, 8 Western.

[415-12172]

UDC 612.178

FUNCTIONAL CHARACTERISTICS OF VARIOUS TYPES OF CARDIAC RECEPTORS

Moscow KARDIOLOGIYA in Russian Vol 20, No 5, May 80 pp 16-19

SAVCHUK, V. I. and SEMENKINA, T. M., Physiological Branch of the Central Scientific Research Laboratory of the 2nd Moscow Medical Institute imeni N. I. Pirogov

[Abstract] The activity of cardiac receptors was studied as a function of chemical factors nonspecific to nerve tissue such as the concentration of H^+ , CO_2 and O_2 pressure, etc. Experiments were carried out on cats under nembutal anesthesia. In general, the results obtained agreed with those already published by other investigators, stressing that among the "somatic pressor" and "somatic depressor" afferent fibers, there exist more specific fibers with real chemoreceptive nature. No definitive data were obtained to refine the mechanism of action of various chemical and pharmacological factors on the mechanic receptor structures of the heart. Along with the typical mechanic receptors of the heart, the authors identified receptors reacting exclusively to changes in blood reactions as well as polymodal receptors--reacting to both mechanical and chemical stimuli. Figures 2, references 8: 5 Russian, 3 Western.

[17-7813]

UDC 615.339:576.858.095.383:611-018.53.012.6

METHOD FOR INCREASING ACTIVITY OF A PREPARATION OF NATIVE HUMAN CADAVER LEUKOCYTE INTERFERON

Moscow VOPROSY VIRUSOLOGII in Russian No 3, May-Jun 80 pp 294-297 manuscript received 13 Aug 79

PARFENDOV, V. V., ZUBANOVA, N. A., MEKHEDOV, L. N., POKIDYSHEVA, L. N., KUZNETSOV, V. P. and MARCHENKO, V. I., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Problems attendant in methods for producing interferon, especially losses in potency of the prepared product, are cited. An especially troublesome aspect is the presence, in the prepared material, of an inhibitor of the antiviral action of interferon. The present article describes a method to produce native preparation of human, leukocyte interferon. Interferon samples were obtained from the production Laboratory for Biosynthesis of Interferon, located in the authors' institute. Cryofractionation of the product has been described earlier (Marchenko, et al., 1970). Condensation of the resulting fractions was carried out in TCF-10 thin-channel cells (Amicon apparatus) assuring sterile handling of the material. Sterilization of the apparatus utilized an autoclave. A diagram of the set-up is presented. Tests of the product indicated no toxicity or reactogenicity. The method provides concentration by a factor of 32 to 250 with no loss of original antiviral activity. The interferon is safe and can be administered by injection. It is recommended for trial as a therapeutic-prophylactic agent for local action in viral affections of the skin and mucous membranes of the eyes, mouth, genitalia, urinary tract and rectum. Figure 1; references 5: 2 Russian, 3 Western.

[471-8586]

RADIATION BIOLOGY

UDC 577.391:577.41/46

REVIEW OF PROTECTION OF SOIL-PLANT COVER AGAINST RADIOACTIVE CONTAMINATION

Moscow BIOLOGICHESKIYE NAUKI in Russian No 4, 1980 pp 18-23 manuscript received
13 Sep 79

TIKHOMIROV, F. A., Laboratory of Radioecology, Moscow State University imeni
M. V. Lomonosov

[Abstract] The most significant sources of radioactive pollution of agricultural areas and natural biogeocenoses are identified as aerosols and gases falling from the atmosphere, radionuclides (basically, neutron activation products), which contaminate agricultural crops and soil by penetration along with irrigation waters and the radioactive elements (basically, Ra, U, Th) placed into the soil as components of mineral fertilizers. Radioactive and some chemical toxic substances usually penetrate the soil in trace quantities. If one accepts the thesis that complete prevention of radioactive contamination of the biosphere is not possible, the need is to control radioactive pollution of the soil-plant cover. Radio-ecologists should develop (i) criteria for standardization of radionuclide quantities exhausted from atomic industry and power enterprises (maximum permissible levels) and (ii) a system of measures in the use of soils exposed to radioactive contamination when that contamination exceeds permissible levels. The problem to be faced when soils are contaminated is how much contamination gets into the food harvest. Four factor categories are said to be involved in transfer of radionuclides from the soil into plant crops and harvested in them: (i) biochemical properties of the technogenic radionuclides--entering the soil in easily assimilated forms (irrigation with increased contamination levels) or difficultly assimilated (from rocks or discarded mine residues); (ii) soil properties--fertility, pH, humus, base exchange, mineral and mechanical features, moisture, local type zone; (iii) biological characteristics of the plants--requirement for those elements isotopic or nonisotopic with the contaminant radionuclides, capacity of the plant for discrimination of the natural analog and the radionuclide, root system; (iv) agrometeorological conditions--precipitation, moisture, immobilization of radionuclides by microorganisms whose presence is related to the cited conditions. Ecological consequences of radioactive pollution are problems which warrant attention. A useful approach to the study of the contamination on ecosystems is use of models (e.g., by T. G. Gil'manov). References 15: 12 Russian, 3 Western.

[382-8586]

UDC 614.777:614.73

REFERENCE LEVEL CALCULATION OF RADIOACTIVE CONTAMINATION IN RESERVOIRS

Moscow GIGIYENA I SANITARIYA in Russian No 3, 1980 pp 31-34 submitted 26 Mar 79

KATKOV, A. E., candidate of medical sciences (Leningrad)

[Abstract] A method for calculating reference concentrations of radionuclides in bottom sediments of reservoirs was presented and described. Reference levels of radioactive pollution of marine and fresh water reservoirs of 26 hygienically important radionuclides and coefficients are presented. Recommendations for counting quotas for practical implementation of the method by sanitary inspection workers are presented. References: 13.

[412-2791]

UDC 577.391.663.12/14

STUDY OF THE ACTIVITY OF SUPEROXIDEDISMUTASE IN RADIATION INJURY OF ANIMALS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 7, 1980 pp 34-37 manuscript received 5 Apr 79

ONCHARENKO, Ye. N., GUDZ', T. I. and PESHKOVA, Ye. G., Chair of Biophysics, Moscow State University imeni Lomonosov

[Abstract] The hypothesis of Tarusov (1962) on the formation of free radicals in peroxide oxidation of lipids is cited. Superoxide anion radicals, which are formed in the aqueous phase of the cell in radiolysis, can participate in the initiation of these reactions. Superoxidedismutase (SODM), present in cells of aerobic organisms, can influence peroxide processes in lipids by regulating the level of active forms of oxygen in the cell. SODM has been found to have a protective effect against ionizing radiation (Petkau, et al., 1975, 1976). The present article examines the effect of ionizing radiation--RUM 11 apparatus, 1000 or 700 rad--on SODM activity in the tissues of irradiated male Wistar rats. Irradiation with 1000 rad did not affect the level of SODM activity in the lining of the small intestine; it decreased. SODM activity somewhat in liver cells but this activity was recovered within 24 hours. The 700 rad dose had no effect of SODM activity. Tests to show whether administration of radioprotectors--serotonin or MEA--affect the activity of SODM in the small intestine established that these protectors have no effect on the SODM activity. This suggested that the protective function of SODM against radiation is an independent link in the protection of the body against ionizing radiation.

References 22: 7 Russian, 15 Western.

[455-8586]

UDC 616-001.28-057-07 616.155.3-018.1 575.224.23

THE CYTOGENETIC EFFECT DUE TO NON-UNIFORM IRRADIATION WITH FAST NEUTRONS UNDER CONDITIONS OF OCCUPATIONAL EXPOSURE

Moscow MEDITSINSKAYA RADIOLGIYA in Russian Vol 25, No 3, Mar 80 pp 29-34
manuscript received 20 Jul 79

ROMANOVA, I. N., SAMSONOVA, L. A., SHURUPOVA, Ye. N. and DYNNIK, M. S., Khar'kov Scientific Research Institute of Medical Radiology

[Abstract] Cytogenetic studies were performed on 39 field workers of geophysical expeditions exposed to neutron Po-Be sources, on 10 controls working in the general area of radiation but not previously exposed to occupational radiation, and on 9 individuals working in the field but not exposed to any radiation. The irradiation was not uniform, and it did not exceed the maximum permissible dose. Moorhead's method of cytogenetic analysis of chromosome aberrations in peripheral blood leucocytes was run on 60-hr metaphase cultures. In comparison to the two control groups, the study group showed a significantly higher percentages of aberrant cells, an increase in chromosome and chromatid aberrations, and a higher number of aneuploid and polyploid cells. The predominant aberrations of the chromosome type consisted of paired fragments and dicentrics without fragments. The latter appear to be sensitive indicators of chronic low dose radiation effects. Figures 6, references 20: 14 Russian, 6 Western.

[327-7813]

UDC 616.001.17+57.008.5+547.953

CHANGES IN PHOSPHOLIPID METABOLISM IN HEPATIC TISSUE UNDER IRRADIATION COMPLICATED BY BURN SHOCK

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian No 12, 1979 pp 1189-1195
manuscript received 8 Oct 79

ALEKSANYAN, K. A., KARAGEZYAN, K. G. and MKHITARYAN, V. G., Chair of Biochemistry, Yerevan State Medical Institute

[Abstract] Quantitative changes in liver phospholipids in the presence of combined radiation and burn shock injury (CRBSI) were investigated in experiments on white male rats irradiated with 500 R and subjected to III- and III⁵-degree skin burns. The isolation and fractionation of hepatic tissue phospholipids were performed by paper chromatography. The ratio of neutral phospholipids to acid phospholipids was found to decrease. Since neutral phospholipids represent the basic building block of biological membranes, the presence of destructive morphological changes can be assumed. Of the individual phospholipids investigated, the phosphatidylinosines decreased most in amount, apparently owing to unsaturated fatty acid oxidation. The level of the other lipids decreased as well and the dynamics of that decrease points to a definite role of autoxidation of these compounds in the formation of the organism's response to the stress producer. Experimental administration of α -tocopherol (vitamin E) as a natural antioxidant (1 mg/kg body weight) served to normalize the quantitative composition of phospholipids in the rat liver.

[312-1386]

UDC 577.778

LONG TERM EFFECTS IONIZING RADIATION ON THE FEMALE RAT ENDOCRINE SYSTEM

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 5, 1980
pp 775-778 submitted 22 Feb 80

DEDOV, V. I., DEDOV, I. I. and TALIPOV, A. Sh.

[Abstract] A histological and electron microscopic study of the neuroendocrine system (the hypophysis, the adrenal glands, the thyroid glands, the ovaries, the mammary gland and the uterus) of 88, 3-month old rats at different periods (1-24 months) after a single, whole body exposure to gamma-radiations (100 Rad) indicated that such dosage produced disturbances of the hormonal balance and the estrus cycle and the formation of tumors of endocrine glands and the target organs. References: 7; figures 2.
[120-2791]

UDC 577.391

A STOCHASTIC EVALUATION OF THE SEQUELAE OF RADIATION DAMAGE OF THE CENTRAL ASIAN TORTOISE

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 3, 1980 pp 55-57 manuscript
received 28 Nov 79

TURDYYEV, A. A., VASIL'YEV, A. N. and DVORNIKOVA, L. I., Institute of Zoology and
Parasitology, USSR Academy of Sciences

[Abstract] Methods of probability theory are used for an objective evaluation of the effect of radiation on the Central Asian tortoise *Testudo horsfieldi*, which has been found to be highly resistant to the action of ionizing radiation. The animals were exposed to cobalt-60 gamma rays at a dose rate of 250 R/min to integrated exposures of from $5 \cdot 10^4$ to 10^5 R. The mean lethal dose is calculated for periods of 30, 60, 90 and 120 days. The results show that the mean lethal dose is stabilized by the 60-th day, and hence that recovery has taken place by that time in critical systems of the organism. This conclusion is confirmed by experimental data on the recovery of specific critical systems. The proposed approach to quantitative evaluation of response of the Central Asian tortoise to radiation gives a sound basis for comparing the processes of development of radiation illness in the tortoise to analogous processes in mammals. Such a comparison shows that the mean lethal dose for the tortoise is two orders of magnitude higher than for mice. References: 6 Russian.
[9644/0149-6610]

MEDICAL DEMOGRAPHY

STATISTICAL DATA BASED ON THE CAPITALS OF UNION REPUBLICS AND CITIES WITH POPULATIONS OF GREATER THAN ONE MILLION PEOPLE

Moscow VESTNIK STATISTIKI in Russian No 12, Dec 80 pp 75-76

[Tables excerpted from full text which appeared in VESTNIK STATISTIKI No 12, 1980]

[Text] 11. Number of medical establishments and number of hospital beds at the end of 1979:

	Number of doctor-staffed medical establishments which provide ambulatory polyclinical care ²	Number of hospitals	Number of hospital beds	
			Thousand	Per population of 10,000 people
USSR	35,696	23,218	3,261,9	123,3
including the following cities:				
Alma-Ata ¹	71	50	16,0	172,2
Ashkhabad ¹	31	19	5,1	159,8
Baku ¹	193	87	20,7	131,8
Vilnius	26	19	9,0	183,0
Gor'kiy ¹	122	69	19,6	144,4
Dnepropetrovsk ¹	98	42	15,2	140,7
Donetsk ¹	61	49	17,3	167,5
Dushanbe	64	25	6,9	137,0
Yerevan	102	42	10,4	100,3
Kazan ¹	113	55	14,7	146,9
Kiev	203	88	30,3	138,2
Kishinev ¹	71	26	8,8	166,1
Kuybyshev ¹	114	66	16,2	132,2
Leningrad ¹	464	141	54,7	117,9
Minsk ¹	104	27	13,8	105,2
Moscow ¹	893	237	110,4	136,3
Novosibirsk ¹	139	64	19,0	142,9

Table 11. continued

	Number of doctor-staffed medical establishments which provide ambulatory polyclinical care ²	Number of hospitals	Number of hospital beds	
			Thousands	Per population of 10,000 people
Odessa	104	41	12,8	120,7
Omsk ¹	96	53	14,9	145,1
Perm'	81	46	14,6	145,2
Riga	64	33	13,2	156,8
Sverdlovsk ¹	83	63	19,7	161,1
Tallinn ¹	38	23	5,9	131,8
Tashkent ¹	229	82	25,6	140,7
Tbilisi	154	60	14,9	137,9
Frunze	60	28	9,6	176,5
Khar'kov	135	64	20,8	141,8
Chelyabinsk ¹	66	50	15,6	149,5

¹

Including urban settlements, governed by municipal soviets.

²

Number of doctor-staffed medical establishments which provide ambulatory polyclinical care to the population including all medical establishments which provide ambulatory care (poly-clinics, out-patient clinics, polyclinical sections of hospitals, medical public health centers and others).

12. Number of physicians and mid-level medical personnel at the end of 1979

	Number of physicians of all specialties		Number of mid-level medical personnel	
	Thousands	Per popula- tion of 10,000 people	Thousands	Per popula- tion of 10,000 people
USSR	960,5	36,3	2,719,6	102,8
including the following cities:				
Alma-Ata	80,0	86,2	13,9	149,2
Ashkhabad ¹	2,6	82,5	3,5	108,4
Bakul	11,2	71,5	19,3	122,8
Vilnius	3,5	72,1	6,7	136,6
Gor'kiy ¹	7,6	56,0	14,9	109,8
Dnepropetrovsk ¹	6,1	56,5	11,3	104,0
Donetsk ¹	5,9	57,6	12,1	117,6
Dushanbe	3,7	74,0	7,1	142,0
Yerevan	6,9	67,0	12,2	118,0
Kazan'	5,7	57,4	9,6	95,8
Kiev	17,5	79,7	29,2	133,3
Kishinev ¹	4,7	89,6	7,8	148,3
Kuybyshev ¹	7,3	59,6	15,7	128,5
Leningrad ¹	35,9	77,5	66,6	143,5
Minsk ¹	8,5	64,7	15,9	121,7
Moscow ¹	73,8	91,1	138,5	171,0
Nevosibirsk ¹	8,2	61,4	15,0	112,8
Odessa	8,6	81,6	15,0	142,0
Omsk ¹	6,2	60,5	13,8	134,1
Perm'	5,6	55,6	11,2	111,2
Riga	6,1	71,8	11,7	139,2
Sverdlovs ¹	7,8	63,6	15,6	127,2
Tallinn ¹	2,6	58,8	5,5	122,6
Tashkent ¹	12,6	69,4	23,8	130,7
Tbilisi	11,2	103,5	15,3	141,4
Frunze	4,3	79,4	8,3	153,1
Khar'kov	9,2	62,9	16,6	113,6
Chelyabinsk ¹	5,7	54,8	12,5	120,1

¹

Including urban settlements, governed by municipal soviets.

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[155-9139]

UDC 616-006.6-084(47+57)

SCIENTIFIC BASES OF CANCER CONTROL IN THE RSFSR

Moscow SOVETSKAYA MEDITSINA in Russian No 10, 1980 pp 3-9

TRUBILIN, N. T.

[Abstract] The state of the national program for control of cancer, the second highest (15.2%) cause of death, is reviewed in this editorial. The oncological network has expanded and now includes 118 dispensaries, 33 rest homes with 790 beds and 1749 oncological consultation services, and available equipment includes 174 high-power gamma-radiation units, 5 betatrons and 1 linear accelerator. The education of medical students and the postgraduate education of physicians have also been more extensively organized. The incidence of lung cancer in men and breast cancer in women has increased but the incidence of some cancers has decreased due to improved medical services. Prophylactic examinations by fluorography have increased 2.5-fold the early diagnosis of stage I and stage II lung cancer; more surgery for cancer has been reported (from 29.9% in 1973 to 31.6% in 1978), and patient survival has improved. Women over 30 are now regularly examined for cervical cancer; patients at high risk for digestive tract cancer are examined by endoscopy. Surgery is still the primary treatment, but the use of radiation treatment alone or in combination with surgery (48.5%) has increased; this is followed by chemotherapy. New problems related to cancer are the social and occupational rehabilitation of cancer patients. The implementation of the orders of the RSFSR Ministry of Health on the mandatory hospitalization of patients in clinical group IV (severely ill) is emphasized. Research in experimental oncology has concentrated on the immunology of malignant growth, mechanisms of carcinogenesis and cancer biochemistry. New diagnostic techniques have been developed, i.e., echographic studies of the liver, cytological diagnosis of cancer of the female reproductive system. Research on the effect of environmental factors on cancer incidence has been insufficient. Further study of this topic and of cancer epidemiology, prevention and control are recommended.

[70-9307]

UDC 616.12-005.5.055.1-07(476.1-211Minsk)

ISCHEMIC HEART DISEASE AND RISK FACTORS IN THE MALE POPULATION OF MINSK

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 8, Aug 80 pp 10-12
manuscript received 19 May 80

ZBOROVSKIY, E. I., FOMINA, R. F., AVRAMENKO, T. V., et al., Laboratory of Social and Preventive Cardiology, Belorussian Scientific Research Institute of Cardiology

[Abstract] Data is presented on 942 volunteers—a representative sample of the 40-59 age male population of Minsk. Among them 133 had ischemic heart disease, 167 were considered normal and the rest exhibited some risk factors. Five risk factors were analyzed: arterial hypertension, hypercholesterolemia, obesity, smoking and lack of exercise. The frequency of ischemic heart disease appeared to increase with age, as did the hypertension and obesity. After reaching a peak in the age group 45-49, cigarette consumption decreased with age. In the study population, at least one risk factor was observed in 38.7 percent, two among 20.7 percent, three in 7.1 percent of individuals; 82.3 percent of ischemic heart disease patients showed these risk factors. There is a need for preventive measures of an educational nature to be directed at large populations. Mass screening should play an important role. References: 7 Russian.

[22-7813]

UDC 614.885:625.1)571.5)

ROLE OF THE RED CROSS IN PROTECTING THE HEALTH OF BAYKAL-AMUR RAILROAD BUILDERS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, 1980 pp 6-10 manuscript
received 6 Aug 79

BALTISYSKIY, V. A. and TYULYANDIN, A. D.

[Abstract] The Red Cross Society (RCS) first began to provide medical aid to builders of the Baykal-Amur Mainline (BAM) in 1974. The BAM Committee of the RCS coordinates the activities of tens of thousands of active Red Cross members among BAM builders, railroaders, and family members, and it has trained more than 2,000 members in various programs such as sanitary inspection, home patient care, and prevention of gastrointestinal diseases. Sanitary-epidemiological inspection is particularly important since the BAM construction proceeds in vast and uninhabited territory. Sanitary inspectors report to the RCS BAM Committee on violations of sanitary rules in workers' settlements and conduct spot inspections of restaurants, stores and water supply facilities. They provide assistance to medical personnel, conduct blood-donor drives, and disseminate medical and hygienic knowledge among BAM workers. The RSFSR and USSR Red Cross societies provide considerable assistance to the BAM Red Cross organizations in the form of sanitary testing kits and information brochures and booklets.

[323-1386]

UDC 616.981.718-036

CLINICAL COURSE OF Q-FEVER FOR THE LAST 20 YEARS

Moscow KLINICHESKAYA MEDITSINA in Russian No 10, 1980 pp 51-53 submitted 17 Jan 80

KASATKINA, I. L., NAURUZZAYEVA, Ye. Ch., PETROVA, N. P., SEYDULAYEVA, L. B. and
ROSOVA, O. V., Chair of Infectious Disease (Head-Doctor of Medical Sciences
I. L. Kasatkina) Alma Ata Medical Institute

[Abstract] A comparison of the clinical records of 150 Q-fever patients under treatment in an Alma-Ata hospital in 1956-1958 and the records of 250 Q-fever patients under treatment in the same hospital in 1975-1977 revealed the presence of the same clinical symptoms (fever, chills, sweating, hepatolienal syndrome) in equal frequency in both groups. The disease was less severe in the 1975-1977 group. The 3 percent relapse rate and prolonged asthenia during convalescence in the 1956-1958 group was not observed in records in the second group. References: 8.
[119-2791]

UDC 616.988.75-085.371+615.281.8]-036.8"1979"

RESULTS OF A STUDY IN THE COMPREHENSIVE TREATMENT OF INFLUENZA WITH VACCINES AND REMANTADINE DURING THE A(H1N1) INFLUENZA OUTBREAK IN 1979

Moscow VOPROSY VIRUSOLOGII in Russian No 4, 1980 pp 425-429 submitted 12 Dec 79

OBROSOVA-SEROVA, N. P., KUPRYASHINA, L. M., RYKHLETSKAYA, N. S., VOLKOV, V. Ye.,
SHTUNDERENKO, G. V., GOL'DENBERG, B. I., KARMANOVA, R. I. and SLEPUSHKIN, A. N.,
USSR Academy of Medical Sciences Institute of Virology imeni D. I. Ivanovskiy,
Moscow

[Abstract] A study of composite prophylaxis of influenza by domestic live A(H3N2) vaccine and inactivated A(H1N1) and B vaccines in combination with remantadine involved the use of these vaccines in one group and the use of a placebo in a second group in the 1979 influenza epidemic. It was found that combined use of the vaccines and remantadine as emergency prophylaxis reduced influenza and respiratory morbidity 3.6-fold while use of remantadine alone produced a 2.3-fold reduction. It was recommended that the vaccines be used singly or in an optimal combination for best results. References: 8.
[116-2791]

UDC 616-036.88-02

CAUSES OF DEATH AT HOME AMONG LARGE CITY INHABITANTS

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 12, 1979 pp 23-26
manuscript received 4 Apr 79

MOROZOV, A. I., Chair of Social Hygiene and Public Health Organization at the 2d
Moscow Medical Institute imeni N. I. Pirogov

[Abstract] According to a number of surveys, 62-85 percent of all patients die in their homes. A retrospective study was carried out in two Moscow polyclinics covering about 70,000 individuals. This study was conducted in four stages. In the first stage, data were abstracted from death certificates from the 1972-1974 period. At the next two stages, ambulatory charts were taken and the relatives were questioned. The fourth stage was used to evaluate the data. During the study period, 859 patients died; 87.4 percent of them died in their homes. Most of the death causes (96.4 percent) were established from medical histories, only 3.6 percent were based on pathological reports. Average age at the time of death was 71.8 years, 61.5 percent of these patients were women. The most common cause of death was cardiovascular disease followed by cancer. No references.

[328-7813]

UDC 614.1:312.2(470.23-25)

AVERAGE LIFE EXPECTANCY IN LENINGRAD AND ITS PROSPECTIVE ALTERATION

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 12, 1979 pp 10-15
manuscript received 11 Jul 78

POLYAKOV, I. V., Chair of Social Hygiene of the Public Health Organization, 1st
Leningrad Medical Institute imeni I. P. Pavlov

[Abstract] Life expectancy depends on the biological characteristics of individuals and on their socio-hygienic living conditions. Currently, two diseases most responsible for the shortening of life expectancy among Leningrad's population are vascular diseases and cancer. Progress in the control of infectious and parasitic diseases will lead to eradication of mortality due to infections by about 1990. Mortality from tuberculosis is on a continuous decline; within a decade, tuberculosis should be under total control. Mortality from respiratory disease should be liquidated by 1990 in the population younger than 50 years of age; in the older population, it will be controlled. The same pattern can be predicted for gastrointestinal diseases. Around 2000-2010, the average age at time of death in Leningrad's population will increase from 69.78 to 72.98 years of age. No references.

[328-7813]

HUMAN FACTORS

CHARACTERISTICS OF THE MOTOR COORDINATION OF HAND-HAND AND EYE-HAND SYSTEMS

Moscow VESTNIK MOKOVSKOGO UNIVERSITETA in Russian No 2, Apr-Jun 80 pp 13-26

BUYAKB, T. M., GIPPENREYTER, Yu. B. and PIK, G.

[Abstract] Two questions were posed in this study: can arbitrary eye movements be coordinated with hand movements in the process of solving a general movement task, and if so, what are the differences in eye-hand motor coordination as compared to hand-hand coordination? To answer these questions, two sets of experiments were performed. The first set studied the hand-hand coordination, the second was aimed at the eye-hand coordination. The results showed that the eyes are capable of coordinating their movements with the hands in terms of time, direction and rythm. During the adjustment period of parallel movements of eyes and hands, some patterns, similar to those found in the hand-hand coordination system, were observed. These patterns include: the necessity to control the performance of each organ, common problems and errors at the coordination stage, and similarity in the internal mechanism of movement synchronization. In addition, specific characteristics of the eye-hand coordinations were noted. These were directly related to the psycho-physiological properties of the eye motor system, which is genetically directed to serve the visual functions. Figures 6, references 8: all Russian.

[354-7813]

UDC 377.5:007.51:612.825.1

INDIVIDUAL FEATURES OF THE HIGHER NERVOUS SYSTEM AND SUCCESS IN TRAINING IN THE PROFESSION OF COMPUTER OPERATOR

Moscow GIGIYENA I SANITARIYA in Russian No 5, 1980 pp 86-87 manuscript received 31 Jul 79

KRIVORUCHKO, T. S. and DUBROVINA, T. N., Moldavian Scientific Research Institute of Hygiene and Epidemiology, Kishinev

[Abstract] Criteria for evaluating physiological and psychophysiological indices in teenagers developed at the Institute were used to predict success in training students for the career of computer operator. Parameters of the higher nervous system studied included the excitation process (the working capacity of nerve cells), absolute duration of the latent period for motor reaction, and changes in this

period. The method of L. G. Kopytova was used for the studies. It was found that students with a good level of excitation assimilated the skills of computer operator more readily than those with weaker excitation levels. Students with good mobility of nervous processes also scored well in testing, while those with average or poor mobility scored badly. The same picture emerged in analysis of reactions to differentiated stimuli: those students with positive results were also those who performed best as computer operators. It was concluded that training of students with slow nervous processes presents considerable difficulties compared with those having average and high mobility. Analysis of results indicated that individual negative factors can be somewhat compensated for by high indices for other factors. Highly qualified computer specialists were also tested as a control to confirm the stability of natural physiological factors used as training criteria. Comparison of these results with results from testing of students indicated that nervous system mobility is the most important criterion for predicting success in training for the career of computer operator. The criteria developed were recommended for practical use in screening and selection of potential personnel.

References: 3 Russian.

[402-9642]

UDC 613.693. [358.422+656.71.071.7]:612.766.1:612.821

PSYCHOPHYSIOLOGICAL PECULIARITIES OF THE WORK OF AIRPORT TRAFFIC CONTROLLERS

Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 3, 1980 pp 49-53

PROLOV, N. I., KOL'TSOV, A. N. and SERGEYEV, V. A., candidates of medical sciences

[Abstract] Analysis of the work of 74 aircraft controllers involving the study of special instructions and warnings involving flights, observance of the work process, time-studies of different stages of the work, questionnaires, talks with flight-control specialists, study of tapes and analysis of errors indicated the intense mental and emotional stress involved in flight control work reflecting on the health, nervous-emotional stability and psychological traits of the persons with more pronounced functional deviations appearing in persons with cortico-visceral diseases as evidenced by the time of simple sensomotor reaction increasing by 30% and more the number of over-reactions and blood pressure increasing by the end of the shift. Recommendations to improve the situation include: replacement of the controller every 3½ to 4 hours for brief rests; scheduling according to age and health of the controller; watch for early signs of psychosomatic diseases and prompt treatment of diseases. References: 11; figures 2.

[299-2791]

UDC 612.017.2

MEDIATION OF THE BIOLOGICAL BY THE SOCIAL IN THE PROBLEM OF ADAPTATION TO EXTREME CONDITIONS

Moscow VESTNIK AKADEMII MEDITSINSKIH NAUK SSSR in Russian No 4, 1980 pp 57-63
manuscript received 16 Nov 79

ADO, A. D., Moscow

[Abstract] A brief discussion of ideological differences between the viewpoint of Marxism and other philosophies with regard to the part played by social factors in man's adaptation to extreme situations. Examples of organization of social forces to mediate existence under extreme conditions include the development of life support systems for spaceflight, various prosthetic devices for replacing impaired organs and missing limbs, and various forms of man-machine systems. One of the areas in which social mediation of biological factors is underestimated is heat exchange under conditions of extreme cold, where men adapt primarily by modification of clothing, shelter, food intake. It is feared that there is an increasing tendency to represent processes of patent damage to the structure of organs and their function as adaptive and useful for the life of the organism. The author feels that the philosophy of dialectic materialism gives the Soviets an edge in this aspect of the problem of adaptation and for useful application of theoretical conclusions to problems such as public health. References 30: 29 Russian, 1 Western.

[9544/0171-6610]

UDC: 612.766:1

PSYCHOPHYSIOLOGICAL ASPECTS OF OCCUPATIONAL SCREENING OF MINERS FOR WORK ON MECHANIZED BREAKAGE FACES OF COAL MINES

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian No 2, 1980 pp 220-227 manuscript received 15 Feb 78

OLEYNIKOV, V. A., Department of Industrial Psychophysiology, Central Institute of Economics and Scientific and Technical Information of the Coal Industry, Stakhanov

[Abstract] The studies involved over 400 miners with at least 3 years of tenure in underground work to determine levels of dynamic and static physical fitness, state of the central nervous system and emotional personality traits, for the purpose of better screening of individuals for this occupation. Criteria included ergometric characteristics and functional exertion (fluid loss, i.e., weight loss per unit of performed work). Correlation between physical performance and difficulty of labor, as well as sociopsychological climate in the group, is discussed. Figures: 1; tables: 3; references 10: 9 Russian, 1 Western.
[317-10,657]

UDC 612.822.3.087

KEY: CORRELATES OF TRAINING BY VOLUNTARY CONTROL OF THE HEART RATE IN MAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 250, No 6, 1980, pp 1487-1490
submitted 26 Sep 79

BORGEST, A. N., TALAN, M. I. and CHERNIGOVSKIY, V. N., USSR Academy of Sciences,
Institute of Physiology imeni I. P. Pavlov, Leningrad

[Abstract] A study was performed on EEG's of four volunteers (two men and two women) 18-20 years of age under hypnosis (two stages) causing muscle relaxation and high motivation for fulfillment of the task, which created the most favorable conditions for training the autonomic function. After training, the amplitude of the alpha-spectrum displayed the well-known inter-connection with the pulse rate in 63 percent of the cases, rising with increased heartbeat and decreasing with a slowing of the heart rate. No clear correlations between absolute values of the heart rate and power of the alpha-spectrum were found. It was assumed that the changes of θ-rhythm, after training control of the heart rate, reflects a very complex interaction involving emotional effects of the setting, as well as the reconstruction of the autonomic functions. References: 12; figure: 1.
[289-2791]

PHYSIOLOGY

UDC: 612.82+616.84

THE ROLE OF OPIATE RECEPTORS OF DIFFERENT PARTS OF THE BRAIN IN FORMING
EMOTIONAL REACTIONS IN RATS

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 9, 1980 pp 1287-1291
manuscript received 6 Dec 79

STANISHEVSKAYA, A. V., and VEKSHINA, N. L., Laboratory of Psychopharmacology
(headed by I. P. Anokhina), Central Scientific Research Institute of Forensic
Psychiatry imeni V. P. Serbskiy, Moscow

[Abstract] Since opiate receptors have been found in virtually all parts of the brain and it is assumed they may be regulators of physiological functions and causes of some mental disturbances, a study was made of the nature of emotional and behavioral changes caused by the local effect of morphine on opiate receptors of the amygdala and gray matter around the cerebral aqueduct. Experiments were conducted on Wistar rats (males) with cannulas imbedded in the amygdalar region and gray matter of the mesencephalon adjacent to the aqueduct, and in some cases nichrome bipolar electrodes were also implanted in the lateral hypothalamus and gray matter around the cerebral aqueduct. Various tests are described, which were used to evaluate the animals' emotional state before and after giving them morphine, which was injected using a Terumo microsyringe in doses of 10 and 40 micrograms into the amygdalar region and gray matter adjacent to the aqueduct, with subsequent verification of proper injection site by histological examination, resulting in distinct, but different emotional reactions: negative with injection of morphine into the amygdalar region, attenuated emotional reaction with injection into the gray matter. Figures 2; references 14: 3 Russian, 11 Western. [85-10,657]

UDC 612.812:591.1.044:599.323.4

THE NATURE OF PROPRIOCEPTIVE INFORMATION PROCESSING OF BRAIN INOCULATED MICE
DURING TRAINING

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 251, No 2, 1980 pp 500-504
submitted 16 Oct 79

VORONIN, L. G., USSR Academy of Sciences corresponding member, SEMENOV, B. F.,
NIKOL'SKAYA, K. A. and OZHERELKOV, S. V., Moscow State University imeni
M. V. Lomonosov

[Abstract] A study of male BAIB/c mice (24 intact and 37 with 0.03 ml of normal
brain suspension injected intracerebrally) as they moved in a labyrinth after
elaboration of a food reflex showed that the nature of reprocessing proprioceptive
information in intact BAIB/c mice was the same as for mongrel white rats studied
previously. Brain inoculated mice maintained capacity for isolation and fixation
of proprioceptive information throughout the experiments but their ability to
integrate and evaluate the significance of information received was impaired. A
basic phenomenon of the training process involved the accretion of information.
The accumulation of much "superfluous" information was caused by the animals'
inability to eliminate "unneeded" proprioceptive information due to weakening of
the inhibition process in the brain. References: 8.
[351-2791]

UDC 612.821

PROGRAMMED GOAL-ORIENTED BEHAVIOR AND THE ASSOCIATION AREAS OF THE BRAIN

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 5, 1980 pp 629-641

BATUYEV, A. S., Chair of Physiology of Higher Nervous Activity, Leningrad State
University

[Abstract] Soviet literature is reviewed to provide theoretical substantiation for
the hypothesis that motivated behavior rests on probability mechanisms, and that the
behavioral program consists of at least three major factors: 1) dominant motivation,
2) long-term memory (determined by previous experience, ontogeny, and heredity),
and 3) evaluation of the extant situation on the basis of short-term memory. The
literature surveyed indicates that the fine orchestration in response to a given
dominant motivation to select a given biologically-programmed response depends,
most likely, on the thalamo-cortical association areas. Figures 1; references:
35 Russian.
[339-12172]

EFFECT OF INTENSE AIRCRAFT NOISE ON THE HUMAN CARDIOVASCULAR SYSTEM

Moscow GIGIYENA I SANITARIYA in Russian No 5, 1980 pp 12-14 manuscript received 27 July 1979

RAZVEYKIN, S. V., STOLBUN, B. M., KARAGODINA, I. L., SURINOVICH, I. S., BERENSHTEYN, I. A. and DZHIGA, K. P., Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman

[Abstract] The effect of aircraft noise on the cardiovascular system in man was studied. Parameters investigated included the functional status of the cardiovascular system, cardiac bioelectrical and mechanical activity and pulse wave propagation; tonometric and pulsimetric investigations were also carried out. Subjects were 243 healthy males aged 30 to 59 who had worked at an enterprise at or close to an airport for at least 10 years. Subjects were divided into two groups: those who had worked at an airport (Group A, 126 subjects), and those who had worked near an airport (Group B, 117 subjects). Maximum noise levels varied between 67dB and 93dB at nearby populated centers, and between 92dB and 116dB at the airport. A positive correlation was found between noise levels and impairment of the cardiovascular system. Subjects in Group A exhibited moderate changes in the cardiovascular indices, as shown by metabolic status and myocardial contractility seen on the EKG as left-side deviation, T-wave depression and decreased R-wave amplitude. Heart rate appeared normal in both groups, but sinus tachycardia was found twice as often as sinus bradycardia. Results agree with earlier studies on the effect of industrial noise. Hemodynamic parameters were normal. Group B subjects had considerably higher diastolic pressure and hypertension than Group A subjects. Systolic hypertension was about the same in both groups. Pulse wave propagation in Group A subjects was definitely higher than in Group B, indicating increased vascular rigidity. Pulse wave propagation was 17.4 m/s in Group A subjects and 14 m/s in Group B subjects. The ballistocardiographic index was lower in Group A subjects (66.4%) compared with Group B (40.6%) and was interpreted as an indication of reduced cardiac contractility. It was concluded that changes in the cardiovascular system are observed not only in the immediate vicinity of aircraft noise but also at nearby populated centers. Functional changes are characterized by reduction of cardiac contractility and changes in myocardial metabolism and increased rigidity of elastic vessels. It was suggested that in these conditions the risk factor for cardiovascular pathology is enhanced. The use of cardiologic investigative procedures is recommended for initial select personnel for work in conditions of aircraft noise. References: 3 Russian.

[402-9642]

UDC 577.3

ON THE FUNCTIONING OF THE HUMAN VISUAL SYSTEM. THE ROLE OF DRIFT OF THE RETINAL IMAGE AND OF RAPID CHANGE IN THE SENSITIVITY OF THE RETINA FOR PERCEIVING COLOR

Moscow BIOFIZIKA in Russian No 3, 1980 pp 548-554 manuscript received 14 Dec 78

YARBUS, A. L., Institute of Problems of Information Transmission, USSR Academy of Sciences, Moscow

[Abstract] Starting from the proposition that light perception depends on the absolute sensitivity of the receiving cells, while color perception is determined by the logarithm of the relationship between 2 color effects, the hypothesis that color is the sum of the vector corresponding to the whiteness of a screen and a vector corresponding to a color in the black-blue-green segment, is discussed in a theoretical test using a gray screen on which a red spot is projected with a light blue-green image in it. Theoretical values are calculated for the reception of these images and for the effects of drift on color perception. Four practical demonstrations are described that employ various colors of light and intensities. References 5: 4 Russian, 1 French.

[001-12131]

UDC: 612.821.61

SOME INDICES OF THE RHYTHM OF CARDIAC CONTRACTIONS IN SHIP CAPTAINS DURING THE LEARNING PROCESS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 30, No 1, Jan-Feb 80 pp 185-187 manuscript received 11 Oct 78

STEN'KO, Yu. M. and STAMBOL'SKIY, V. N., Laboratory of Physiology and Psychology of Labor, Scientific Research Institute of Water Transport Hygiene, USSR Public Health Ministry, Moscow

[Abstract] A study is made of the coefficients of variation of certain indices of heart rhythm in ship captains as they take courses intended to improve their qualifications using a radar training device. The 100-120 remotely recorded ECG's were processed to produce histograms of the R-R intervals using a data general Nova-2 computer. Some 37 ship captains were utilized as subjects in the study. The coefficient of variation of mode and amplitude of mode of the histograms can be used as indicators of nervous and emotional stress, since the balanced nature of the nervous and humeral processes regulating the rhythm of cardiac contractions is disrupted at moments of high nervous-emotional stress. Dynamics of the coefficient of variation during the stages of the training day are illustrated. Figure 2; references: 3 Russian.

[371-6508]

UDC 612.821.6+612.858.751

PHYSIOLOGICAL MECHANISMS OF SPATIAL HEARING

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian No 2, 1980 pp 288-295

SHCHERBAKOV, V. I. and KOSYUGA, Yu. I., Neurophysiology Laboratory, Medical Institute, Gor'kiy

[Abstract] Studies were conducted on the central mechanisms of sound localization, using the combination of a conditioned food reflex, spatially significant conditioned sound stimuli, and reversible short-term cryo inactivation of temporal cortical areas AI, AII, Ep, and IT in the cat. In addition to these unilateral and bilateral studies, the effects of unilateral inactivation of AI and/or destruction of the cochlea were also evaluated. The resultant data demonstrated that animals in which only unilateral cortical sound representation was retained projected the sound to the contralateral intact hemisphere at the level of continuation of the interaural axis. These findings suggested that during evolution several mechanisms of sound localization arise in succession, and that all are retained and subserve the most advanced binaural bitemispheric mechanism. Sound localization in the intact animals consists of afferent-efferent integration, the neurophysiological substrate of which has both spatial and temporal components. Figures 3; tables 1; references 20: 10 Russian, 10 Western.

[137-12172]

UDC: 612.82:615.844+615.849.11

A METHOD FOR TELESTIMULATION OF THE BRAIN

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian No 2, 1980 pp 278-280 manuscript received 27 Nov 78

KHODOROVSKIY, G. I., ROZENBERG, A. M. and MUSLITSKIY, V. F., Chair of Human Physiology, Chernovtsy Medical Institute

[Abstract] A new device developed by the authors is described and illustrated. It is intended for telestimulation of the brain, as an improvement over previous methods, eliminating some of the latter's flaws, such as radio interference, unstable high frequency generator, complexity of operation and large size. Circuitry of the new device is also illustrated. The device was tested on rats.

Figures: 4; reference: 1 Russian.

[317-10,657]

HUMAN EYE PERCEPTION OF INFRARED LASER RADIATION

Moscow BIOFIZIKA in Russian No 2, 1980 pp 305-306 manuscript received 19 Feb 79

PROKOP'YEV, V. Ye., Institute of Atmospheric Optics, Siberian Branch of the USSR Academy of Sciences, Tomsk

[Abstract] Pulsed discharge laser beams were used to test visual perception of infrared radiation lasting 1 nanosecond in the range of wave lengths of 0.9 m 1.5 m, and up to 10 W/cm of incident radiation, both at the end of the laser tube and output of an MDR-3 monochromator. A visual comparison was made of color perception to the spectra of radiation of hydrogen, helium, neon and continuous spectrum of radiation from an incandescent lamp. The results are tabulated, with listing of wavelength of laser, wavelength perceived by the eye, threshold power and active laser medium. Table 1; references 6: 5 Russian, 1 Western.

[309-10,657]

UDC: 812.821.2

DISTINCTIVE FEATURES OF VOLUNTARY SHORT-TERM MEMORY IN INDIVIDUALS WITH DIFFERENT LEVELS OF FUNCTIONAL LABILITY OF THE MAIN NERVOUS PROCESSES

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian No 2, 1980 pp 171-177 manuscript received 20 Mar 79

SIROTSKIY, V. V., VORONOVSKAYA, V. I., KOL'CHENKO, N. V. and PANCHENKO, V. M., Laboratory of Physiology of Higher Nervous Activity, Institute of Physiology imeni A. A. Bogomolets, Ukrainian Academy of Sciences, Kiev

[Abstract] Studies were made on 52 subjects to verify the hypothesis that individual memory is determined by both social and biological factors, such as individual properties of the nervous system, as indicated by various researchers, as well as to clarify existing contradictions as to significance of specific nervous process to memory. The memory tests involved two-digit numbers, unrelated words, road signs, geometric figures and differently marked triangles. Short-term memory scores and coefficients of correlation between productivity of short term memory and functional lability of the main nervous processes are tabulated. Figure 1; tables 3; references: 19 Russian.

[317-10,657]

FUNCTIONAL AND DESTRUCTIVE EFFECTS OF FOCUSED ULTRASOUND ON THE ANIMAL BRAIN

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 66, No 6, 1980 pp 802-09 manuscript received 3 Feb 79

VARTANYAN, I. A., RATNIKOVA, G. I. and TSIRUL'NIKOV, E. M., Laboratory of Comparative Physiology of Sense Organs, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov

[Abstract] Methods to produce functional changes and minimal destruction using ultrasound were established by light microscopy examination of 23 grass frog brains (with another 23 in a control group). The dependence of morphological changes with intensity and length of ultrasound exposure was established. Minimal localized changes occurred with 30 sec exposure at an intensity of 160-350 watts/cm². Increased exposure time led to cellular changes, especially cellular dilation and hemorrhage. Morphological data from ultrasound radiation and tests with galvano-cauterization show that the results are not only due to the heating effect of the ultrasound. Temperature changes in the experimental area were less evident in live animals than in carcasses. The authors suggest that the reparative mechanism is not at the cellular level, but rather at the tissue system level. There was also a lack of brain tissue changes with pulsed ultrasound even when the energy level was significantly greater than the energy from a constant exposure, corresponding to expressed morphological changes. The final result is consequently determined by exposure timing, rather than by the amount of energy. Figures 5; references 10: 4 Russian, 6 Western.

[006-12152]

PSYCHOLOGY

STAGES OF MENTAL ADAPTATION UNDER ALTERED CONDITIONS OF EXISTENCE

Moscow VOPROSY PSIKHOLOGII in Russian No 4, Jul-Aug 80 pp 50-59

LEVEDEV, V. I., Moscow

[Abstract] An analysis is made of stages of mental adaptation for various kinds of altered living conditions, such as sensory deprivation, isolation, spaceflight, submarine duty, hypokinesia, polar expeditions and the like. Salient features of emotional, physical and behavioral stress are examined for each of seven stages: the preparatory stage of mental strain; the stage of acute mental responses; the stage of relative mental adaptation; the transitional (mid) stage of mental strain; mental strain of the concluding stage; the stage of emotional "resolution"; the stage of mental readaptation. References 35: 32 Russian, 3 Western.
[9644/0777-6610]

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REPORT ON PSYCHOANALYSTS' CONFERENCE

Moscow LITERATURNAYA GAZETA in Russian 21 May 80 p 13

PRANGISHVILI, A., BASSIN, F. and SHEROZIYA, A.

[Abstract] This is a report on the International Scientific Conference on Subconscious Psychical Activity. The conference was held last fall in Tbilisi. The report criticizes foreign delegates, particularly French, for wanting to broaden the scope of the subconscious by "disputes about the social and ideological significance of psychoanalysis." The Soviets wish to restrict the concept of the subconscious to its clinical and scientific manifestations. The World Psychoanalytical Association, that "church" of Freudian teachings, which "observes their purity and punishes heretics," is accused of making "groundless claims" for psychoanalysis as an all-embracing science of human psychic behavior and social life. The topic most discussed at the conference was the attempts of some psychoanalysts to proclaim the slogan "Where there is no psychoanalysis, there cannot be freedom of personality!" The French Professor Leclerc is particularly criticized in this connection. Nevertheless, a continuance of this kind of East-West dialogue is favored.
[418-1386]

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